From: Tzhone, Stephen
To: Bartenfelder, David
Cc: Berg, Marlene; Huling, Scott
Subject: RE: Arkwood
Date: Tuesday, January 19, 2016 4:55:00 PM

Hi Dave,

Glad you're back!

I just got off the phone with the McKesson project manager. They submitted gw responses to our comments last Friday (I'll send in next email), but he indicated that they would still like clarity for the questions they sent on 12/31/2015 (I had forwarded those to you in an email dated 1/4/2016).

Can you take a look and let me know what you think?

Thanks,

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From: Bartenfelder, David
Sent: Tuesday, January 12, 2016 2:55 PM
To: Tzhone, Stephen
Cc: Berg, Marlene; Huling, Scott
Subject: Arkwood

Steve-

Sorry for taking so long to get back to you, but the recovery from my surgery in December experienced some major setbacks with a post-operative infection.

Let me first say that I agree with the technical points that Scott wrote in his 12/10 email. I would like to augment some of Scott's thoughts with the following thoughts:

1. For Scott's first point, there is not a SF regulatory designation of colloid size. I would suggest not using colloid, but using facilitated transport instead. This is probably a better presentation of the issue, colloid might be too narrow of an interpretation. In fact, Region 4 developed an internal guidance that actually speaks to the issues of facilitated transport on groundwater and the analytics associated with the many congeners. The lead for the effort was Kay Wischkaemper, who has since retired to Texas. Colloid size particles play a large role in the greater migration of low solubility COC in groundwater, Kay found PCBs much deeper in an Alabama aquifer that expected. However, other particles sizes also contribute

and should be evaluated. This could include nanomaterials that are smaller than colloid, but also some of the larger clay and silt particles. All these particles are initially worth considering. If there were some filtered and non-filtered samples, one could have a three-point decision logic: both samples do not present PCBs at a level above regulatory concern and therefore are not an issue, the filtered samples are below regulatory concern but the non-filtered are above regulatory concern and indicating the facilitated transport mechanism is viable (consideration needs to be given on the sample collection method and filter size (e.g., 0.45 micron or other)), and lastly if both the filtered and non-filtered samples are above the regulatory level then there is sufficient water solubility possibly due to near proximity NAPL presence and/or co-solvency and there are factors supporting the facilitated transport of PCBs.

2. I also agree with Scott's second point, but think it is less an issue for groundwater as it is for surface water (I do not plan to get into the surface water discussion here).
3. Once again I agree with Scott. Any sampling design would need to incorporate safeguards to either eliminate, minimize artifacts or be able to account for them.

The attached Word file raised some good points when considering the path-forward at the site. The first discussion point raised the issue of turbid flow greater than 30-40 gpm. I suspect this was mainly for surface water and not an issue for groundwater. The third point raises the issue of filtered versus non-filter samples. This is worth undertaking as a scoping study and address the need or not to continue more exhaustively (see #1 above). Lastly, Jim Fleer raises the issues of filtering not collecting all the "colloid" material and this is a valid concern depending on the sample collection approach and filter size used. Serious thought needs to be given to this activity and if a more detailed filtering approach is undertaken. Scott cam give you some good advice with this.

In conclusion, I would not make too much out of "facilitated" transport unless some preliminary investigation warrants it since it might not be an issue at all or one of minor consequence compared to other issues at the site.

Hope this helps, but contact me if you have any questions. Best if you send me an email instead of calling since I will probably be working from home for at least another week.

Dave

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